Fitness of two Mediterranean coastal rocky fishes: the role of Marine Protected Areas and stochastic autumn heavy storms

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During the last three decades several studies of fish density, reproductive traits and condition showed a clear contrast outside and inside marine protected areas. The trophic complexity and the available food changes depending on the protection level and the complexity of the food chains due to the presence of predators have been key points argued for such trends. The food availability inside and outside of the MPA will be reflected in the fitness of fishes (energy reserves in the form of lipids). Stochastic effects (e.g. easterly heavy storms) may change the seascape and the presence and abundance of some species which may be essential food for the fish population fitness inside and outside the MPAs. To better understand the effects of the MPAs (Medes Islands and Montgrí coast) in the population fitness before and after a heavy easterly storm we studied the biochemical levels (protein-carbohydrate-lipid balance), trophic markers and stable isotope of *Diplodus sargus* and *Pagellus erythrinus* (species representative of rocky sublittoral areas with differences in their distribution, density, diet preferences and trophic impact in the community). These indirect tools may be good indicators to investigate the MPA effects and the potential changes of food availability in fish populations. The results showed by the stable isotopes reflect that in MPA these fishes feed more on algae whilst outside the feeding behaviour is more omnivorous. The fatty acid trophic markers confirm this idea, being more concentrated inside the MPA. After the heavy storm of December 2008 the indicators of *Pagellus erythrinus* have a very similar trend inside and outside the MPA, but the fitness seems to be clearly lower respect the previous year. *Diplodus sargus*, an opportunist species, seems to have a different capability to store energy, being less affected than the *Pagellus erythrinus* by the storm effects. These results explain the importance of trophic strategies of fishes in their potential fitness recovery after stochastic events, as well as the role of healthier ecosystems as the MPAs.

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